Penguins and tabular berg off Cape Royds. It is estimated that only about one sixth or one eighth part of these tabular bergs appears above the water, so there are probably 500 or 600 feet of ice below the surface.

Aleutians ripe for earthquake

May 13 (AP)

Mohonk Lake, N.Y. — A sparsely populated area of Alaska's Aleutian Islands appears ready for a potentially disastrous earthquake, but it is impossible to predict how soon the event will occur, geologists reported today.

Scientists from Columbia University's Lamont-Doherty Geological Observatory said the coming earthquake — which could unleash a massively destructive tidal wave — would be greater than magnitude 8.0 on the Richter scale.

The Richter scale is a measure of ground motion as recorded by seismometers. The San Francisco earthquake of 1906, which occurred before the scale was established, has been estimated at 8.3; the 1964 Alaskan earthquake measured 8.6.

"What we're saying is the area seems to be well along in what we call the great earthquake cycle and therefore seems to be close to producing another great earthquake," said Leigh House, who presented the findings to a conference here.

"We can't say when it would happen. It might be 10 or 20 years away, possibly longer. But this is an area that seems to be ripe for a really big earthquake," he said in an interview.

House said the greatest danger of an earthquake in the sparsely populated region was that of a tsunami, or tidal wave, which could destroy the vital fishing industry and damage coastal areas as far away as northern California and Hawaii.

About 70 scientists from 11 nations are attending a week-long conference on earthquake prediction sponsored by Lamont-Doherty.

House said the earthquake-prone area stretches about 120 miles from Unimak Island at the eastern end of the Aleutians to east of the Shumagin Islands off the Alaska coast.

This is the second such area to be identified in Alaska.

Scientists from Lamont-Doherty and the U.S. Geological Survey said last year there was a high probability of an equally great earthquake in an area called the "Yakataga gap" on the mainland near the Canadian border.

Scientists believe most southern Alaskan earthquakes occur as a result of the collision between the great plate of the earth's surface that lies under the Pacific Ocean and the North American plate that includes Alaska.

The Pacific plate is plunging under Alaska at a rate of about 2 inches a year. Earthquakes occur when surface rocks shift suddenly to relieve the accumulated stress. The "Shumagin gap," House said, is an area where few small earthquakes are occurring, indicating that stresses may be building, which could be relieved only by a very large earthquake.

House, John Davies, Lynn Sykes and Klaus Jacob made their forecast partly on observations by a network of seismographic instruments installed in the area since 1973.

The Columbia scientists also studied historical records left by Russian fur traders and missionaries, which showed that stresses in the region were relieved by great earthquakes in 1788, 1847 and possibly 1903.

"Here we have an area that seems to be having a great earthquake on the average about every 50 to 60 years, and it's been 77 years since the last one, Sykes said.

Find Whales Rewrite Their Songs

SAN FRANCISCO (AP) — A decades-long study of the haunting songs of humpback whales shows the surprisingly complex tunes are constantly rewritten, a New York zoologist said

"The amazing thing that we're finding is that the song is constantly changing. The song is evolving," said Katharine B. Payne of the New York Zoological Society.

"This is something that no other animal does as far as we know and we don't understand the significance of it," she said at a news conference at the annual meeting of the American Association for the Advancement of Science.

Mrs. Payne and her husband, Roger, have been recording and analyzing whale songs for 22 years near Bermuda, the West Indies, Hawaii and Mexico.

She said whales at each location sing their own song — a melodious series of hums, grunts, growls and squeaks. "But they have a structural pattern that is very complicated and seems to be adhered to by humpbacked whales the world over," she said.

The pattern, in which sounds are arranged into eight to 10 repeated themes for each 15-30 minute song, apparently is inherited, she said.

But within these rules, the 50-ton, 50-foot mammals have ample room to improvise, changing "the kinds of sounds, the combinations, patterns, timing and pitch," she said.

But, she added, the changes are adopted by all whales in the group "You don't find every whale off singing his own thing. Everybody's up on the current vogue. They know what the latest, hottest thing is every day," she said.

Since the song identifies each whale by group, Mrs. Payne said it should allow the first accurate census of the big mammals. That will help in managing, studying and protecting the humpbacks.

For scientists, "the fascination of this is that now we have a process for studying the cultural transmission of some animal other than man," she said.

The humpbacks, protected from hunters, migrate annually from feeding grounds near the poles to breeding grounds in tropical waters. They sing only during the six-month breeding season.

And although the songs seem never to be repeated after they are changed, when the whales return to the tropics after six months of silence "they pick up their song right where they left off."

Mrs. Payne speculated the whale songs, like bird songs, may be associated with courtship and with warning other whales to keep their distance.

But, she cautioned, "I do not mean to imply any meaning to these sounds . . . We don't really know their significance for the whales at all."

Among many unanswered questions, she said, are how the whales make the sounds and whether each group has a ringleader or composer that decides the changes.

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AUGUST HOWARD, Editor

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Eskimo whale kill is 6

Associated Press

Six whales have been taken in the Bering Sea this year, including the first whale by Shaktooklik villagers in recent memory, according to the North Slope Borough.

Borough spokesman John Buchholdt said unprecedented ice conditions have blocked off bowhead whales trying to head through the Bering Strait to the Arctic Ocean. As a result, Buchholdt said, Arctic Ocean whalers "have had sunshine and beautiful leads, everything but the whales."

The ice has caused whales to bunch up in the Bering Sea, and to swim east into Norton Sound where they are seldom ever seen, Buccholdt said.

He said villagers at Shaktoolik shot their bowhead with rifles, mistaking it for a beluga.

Buccholdt said by chance, Charlie Edwardson Sr. was visiting Shaktoolik with other representatives of the Barrow Assembly of God Church to conduct a joint service. The visiting Barrow whalers were able to help Shaktoolik residents recover their bowhead, touching off a major celebration over the weekend.

Buchholdt said Shaktoolik's good fortune has caused some consternation in the National Marine Fisheries Service, charged with enforcing International Whaling Commission quotas. "Shaktoolik does not have a whale under the quota," Buchholdt said. "It is not even a member of the Alaska Eskimo Whaling Commission."

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The Polar Times

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No. 90 *JUNE 1980*

Time of Transition at Barrow

By Gerald E. Bowkett
Editor, *Now in the North*

"This is the last official flight of the Twin Otter . . ." veteran arctic pilot Lloyd Zimmerman announced over the intercom as the aircraft climbed from the runway of the Naval Arctic Research Laboratory and headed toward nearby Point Barrow.

In the cockpit with Zimmerman on that flight—last February 22—was University of Alaska President Jay Barton, making his first official visit to the laboratory, operated by the university for the Office of Naval Research.

Among the passengers aboard were Mrs. Barton, UAF Vice Chancellor for Research Keith Mather, Dr. Dael Wolfle of the University of Washington's Graduate School of Public Affairs (and former publisher of *Science* magazine), and Dr. Gary Laursen, assistant director for science at NARL.

Wolfle had served as chairman of a workshop last November—funded by the Navy—to consider how the laboratory might be maintained after the Navy withdraws as sponsor in 1982.

After circling Point Barrow, Zimmerman, a NARL pilot since 1960, took up a westerly course, giving his passengers a superb view of the ice-covered Arctic Ocean, the North Slope tundra and local landmarks—the Dew Line station, NARL, Browerville, Barrow and the Wiley Post-Will Rogers Monument.

On March 10 Zimmerman flew the Twin Otter to Lincoln, Nebraska to return it to the company from which it had been leased. NARL's remaining aircraft, a Single Otter and Cessna 185, were to be flown to the university's Poker Flat Rocket Range near Fairbanks by the end of March for storage or possible support service there.

The action was in compliance with a Navy request to discontinue air support operations by March 31. Earlier, budget restrictions had made it necessary to close the NARL library and to begin closing down the Animal Research Facility which at the peak of its activity housed 116 animals, including polar bear and wolves. The animals are being shipped from Barrow as new homes can be found for them. This month, "Irish" the polar bear, a 14-year resident of the NARL animal facility, took up residence in a Rhode Island zoo.

On February 18, three days before Barton arrived at NARL, the Twin Otter made its last operational flight, to Fletcher's Ice Island in the eastern Arctic Ocean some 550 nautical miles west of Barrow. Zimmerman, the pilot, was accompanied by John "Jumper" Bitters, field project specialist, and Rick Mason, aircraft and power plant mechanic supervisor. Their mission was to install a navigation buoy on the island, also known as T-3, which would continuously report its position to the Nimbus-6 satellite system.

Information provided by the National Aeronautics and Space Administration and William Dehn of Sea Ice Consultants of Camp Springs, Maryland led the party directly to T-3, reported Dr. John J. Kelley, NARL's technical director.

The team landed on smooth sea ice near the island, for many years an American research base, and later moved to its old runway. They installed the buoy and spent the night in one of the station's buildings, still in good condition. On moving to the station they ran the U.S. and state flags up an existing flagpole by the messhall. They brought the flags back with them to Barrow on February 19, and the state flag, packed in a special display box, was subsequently presented to Barton by Kelley.

T-3, a thick section of glacier ice, has served intermittently as an American ice station since 1952 when Joseph Fletcher, then an Air Force officer, led the first scientific expedition to the island. Presently the deputy director of the National Oceanic and Atmospheric Administration's Environmental Research Laboratories, Fletcher was given an honorary degree by the University of Alaska last year.

Barton returned to NARL on April 1 to attend a change-of-command ceremony. Lieutenant Commander Maria Kazanowska, an oceanographer previously attached to the Office of the Deputy Chief of Naval Operations in Washington, took command of the facility from Lieutenant Commander Michael E. Brown.

Rear Admiral Albert Baciocco, Jr.

The new Naval Arctic Research Laboratory, large building on right, dominates the old Pet 4 camp near Barrow.

chief of naval research, also attended the ceremony. Barton had lunched with him in Washington in early March to discuss the future of NARL.

The shifting of its interests to other portions of the Arctic Ocean and the steep rise in NARL operation costs have been cited by the Navy as the chief reasons for its decision to give up the laboratory.

The university would like to take over the laboratory—if adequate funding can be obtained. A number of government departments and agencies have an interest in continuation of the laboratory and might be sources of some of the funding that would be needed to finance an effective operation. The state too is a possible source of some of the needed funding.

Speaking before the Fairbanks Chamber of Commerce in early March, Barton said he had "spent a good deal of time in Washington talking to people in the State Department and the National Science Foundation, in the president's Office of Science and Technology and in the Congress about the need for the United States to develop a more formal policy on the Arctic. My hope is that we will be able to retain (NARL) as a research laboratory for the University of Alaska . . . My hope is also that we in the university and in the state . . . share fully in the development of arctic policy, especially arctic research policy. As far as the United States is concerned, Alaska is the Arctic."

The Delta Group of the legislature's Future Frontiers Conference, held in Anchorage last December, made the following recommendation: "Consider adding the Naval Arctic Research Laboratory as a facility for the University (of Alaska) if federal funds are withdrawn."

NARL is the only U.S.-supported year-round research and support facility in the northern arctic regions.

Writing about NARL in *United States Naval Institute Proceedings* in September 1969, Lieutenant Commander Robert D. Wells had this to say of its contributions: "While most arctic studies cannot easily be given a cash value, NARL's early research programs in permafrost and arctic construction techniques have already paid off . . . it has been said that the cost savings (in construction of the Distant Early Warning Line in the mid-1950s) directly attributable to NARL's permafrost and Dew Line feasibility studies . . . were greater than the total cost of NARL up to that time."

John J. Kelley, director of the Naval Arctic Research Laboratory, Barrow.

NARL permafrost and other pertinent studies were also of considerable value in the design of the trans-Alaska oil pipeline. In the early 1970s, NARL provided much of the support for the Arctic Ice Dynamics Joint Experiment (AIDJEX), the largest U.S. research effort to that time on the Arctic Ocean ice pack. Data obtained from that effort were expected to faciliate future arctic navigation.

Since 1977, the NARL science staff has been assisting the North Slope Borough School District in the development of science programs. The need for environmental information on endangered whales in and around the Beaufort Sea lease areas led to initiation at NARL of the Project Whales program.

In remarks to last November's workshop on the future of NARL, Kelley noted that during its 32-year history NARL had had its ups and downs but always managed to survive. ". . . I can't really believe," he said, "that the axe will fall on an institution that has, and still does, contribute so much to . . . arctic environmental and engineering knowledge."

A report produced by the workshop states:

". . . The Navy's need for the laboratory has declined, but the nation's need has not. Witness the large current Outer Continental Shelf Environmental Assessment Program, the sale of drilling rights in the Beaufort Sea, the future of the National Petroleum Reserve, Alaska, the emerging concerns of the native population in policy matters and their scientific and technological needs, the national concern over human-induced atmospheric changes and their possible climatic effects, and increasing annual expenditures for many kinds of arctic research; and witness also recent reaffirmations by the National Research Council of the continuing and future needs for basic research on arctic problems and for improved knowledge for the engineering development that will surely come . . . ."

Now in the North, a publication for faculty and staff of the University of Alaska, is published four times during the academic year. APRIL 1980

Prince Philip warns of polluting Arctic

LONDON — An era of exploitation is ahead for the Arctic that could pollute its vast natural wilderness, Prince Philip told an international conference yesterday. Opening a meeting organized by the Monaco-based Arctic Committee and Britain's Royal Geographical Society, the husband of Queen Elizabeth II warned against polluting the Arctic as man moves to develop its resources of uranium, gold and other valuable minerals. "Modern civilization needs new resources but there is one very important proviso — that permanent, irreversible or unacceptable levels of environmental damage must not be allowed," he told the gathering. March 12 (AP)

5 U.S. Sky Divers Land On Ice Near North Pole

May 2 (UPI)

A five-man American team has parachuted onto a frozen ice cap 400 miles from the North Pole in the most northerly sky dive in history, it was disclosed today.

The team, led by Craig Fronk of Issaquah, Wash., also included Mike Dunn of Carson City, Nev.; Don Burroughs of Miami; James Crook of Cary, N.C., and John Ainsworth of Charlotte, N.C.

The polar expedition took off from its base camp in a DeHaviland Twin Otter and landed on a polar ice cap at 84 degrees north, 70 degrees west, and set up a camp to prepare for the jumpers, according to a ham radio operator, Richard Duane of New Jersey.

"At 9:18 P.M., Eastern daylight time, Thursday, the aircraft took off with the sky-diving team and at 9:27 P.M. the sky divers jumped from the plane," Mr. Duane said. "They all landed safely, at 9:36 P.M., making it the northernmost sky-diving expedition ever completed

After spending six hours on the ice, the sky divers and other team members flew to Ellesmere Island aboard the ski-equipped plane.

Eskimos from 3 nations plan to form coalition

Associated Press June 28

Godthaab, Greenland — Representatives of an estimated 90,000 Eskimos from three nations — including 100 from Alaska — gathered here today to forge an international coalition to protect their culture and environment and get a bigger share in any exploitation of resources.

In the four-day conference 54 delegates from United States, Canada and Greenland plan to adopt a charter for a new body known as the Inuit Circumpolar Conference. Inuit, meaning "human being," is the title preferred by Eskimos.

"Instead of always looking to the white communities, we want to look the other way — to the Inuit people," said Hans-Pavia Rosing, chairman of the conference's organizing committee.

Rosing also is a senior Inuit official in the Greenland Home Rule Administration, which came into existence 15 months ago when Denmark granted Greenland internal autonomy. The Danes will continue to direct foreign and defense policy for this 840,000-square-mile island, largest in the world.

The 40,000 Eskimos in Greenland outnumber Danish settlers 4-1, but they are minorities in the United States and Canada. All Eskimos are subject to the laws of the nations in which they live.

There are an estimated 5,000 Eskimos in Siberia, but the Soviet government did not grant any of them permission to attend the conference.

The search for some kind of formal communion among the scattered Eskimos reflects a desire to preserve their cultural identity and their stake in the Western exploitation of the actual or potential mineral and oil wealth of their frozen homelands.

Rosing said the delegates here will have "much to learn from the Alaskans" — a reference to the 1971 Alaska Native Claims Settlement

Many Eskimos, particularly in Greenland, still live primarily by fishing, and are more concerned about Western pollution than profits.

"We are very vulnerable to the kind of resource-hunting there is from the white communities . . . If you destroy our land, you destroy our way of life, our culture, our language."

Eskimo determination to have a bigger say in who does what to their lands — and at what price — is laced with pragmatism.

Rosing concedes the delegates will not, for example, attempt to give Eskimos sole power to lay down conditions on oil and minieral exploitation and the movement of commodities.

But the Eskimos clearly hope their new international body will be able to drive tougher bargains and attain more security.

"Our powers are limited and we recognize this," said Rosing. "For a long period a lot of very important decisions will be taken by the United States, Canadian and Danish governments.

"At this stage we want to participate in all questions relating to the Inuit people, but realizing that we are not sovereign areas and each bound to the different governments."

Rosing is new Eskimo group head

Associated Press June 30,

Godthaab, Greenland — Eskimos from the United States, Canada and Greenland Monday elected a Danish-educated Greenlander to head the first permanent international organization of Eskimos.

The 54 delegates attending the four-day Inuit Circumpolar Conference unanimously elected Hans-Pavia Rosing president. The 32-year-old Rosing is the director of public information in the home-rule administration formed 15 months ago when this huge arctic island with 41,000 Eskimos was granted a large degree of autonomy by Denmark.

"This is an historic event," Rosing said. "This will mean a unanimous political voice for the Inuit" Eskimo.

The ICC delegates also elected two representatives from each country to an executive committee. They are Oscar Kwagley and James Stotts of Alaska, John Amagaolik and Mary Simon of Canada and Lars Chemnitz and Akalook Lynge of Greenland.

There are an estimated 5,000 Eskimos living in the arctic regions of the Soviet Union, but the Soviet government did not allow them to send representatives to the conference.

On Sunday, the second day of the conference, the delegates adopted a charter to set up the international organization for some 100,000 Eskimos scattered across the oil and mineral-rich northern zones of Alaska, Canada and Greenland.

Formal ratification was put off for two years at the request of the Canadians, who feared an international grouping could jeopardize their land-claim negotiatons with the Canadian government.

Rosing, son of a Greenlander who formerly sat in the Danish Parliament, has spent more than half his life in Copenhagen.

"My first task is to spread to the Inuit what the ICC is, what we are trying to do," Rosing told reporters.

He was asked if the ICC planned to contact the governments in Washington, Ottawa and Copenhagen, and replied: "They will feel the affects, they will be hearing from us, but I wouldn't like to say when."

World's Eskimos sign oil pact

Associated Press June 29

Godthaad, Greenland — Eskimos from the United States, Canada and Greenland adopted a charter Sunday to gain greater control over the mineral wealth in their homelands but postponed formal ratification at the insistence of the Canadian delegation.

A two-year delay was accepted to allow Canadian Eskimos time to press land claims with the Ottawa government. The Canadian delegation to the Inuit Circumpolar Conference told Americans and Greenlanders that formal association with the international Eskimo body could jeopardize their national claims.

Conference organizers said the delay essentially was technical and that organized cooperation would begin well before the July 1, 1982, ratification deadline.

The 54 delegates to the conference broke into prolonged applause after adoption of the charter. It signaled the first formal communion of some 90,000 Eskimos whose huge arctic and sub-arctic homelands contain vast oil and mineral deposits vital to the Western world.

The charter provides for an 18-member general assembly drawn equally from Inuit, or Eskimos, in the three countries. It would promote Eskimo unity, culture, "greater self-sufficiency" and "adequate Inuit participation in political, economic and social institutions."

The charter refers to the entire circumpolar region as the "Inuit homeland" with resources "of critical importance to the international community."

An Alaskan delegate suggested that some of the billions of dollars of oil taxes conrolled by Alaskan Eskimos could be diverted to Greenland, enabling this arctic island to leave the European Common Market.

Greenland's 41,000 Eskimos became reluctant members in 1972 when Denmark, which ruled Greenland directly until last year, joined the nine-nation European community.

Multinational corporations abandoned oil and gas drilling off Greenland's west coast two years ago when they found nothing. Greenland depends on Denmark for most of its budget and also receives some $12 million annually from the Common Market.

Jon Buchholdt, a delegate from Alaska's North Slope Borough, said Alaskan Eskimos could easily match the Common Market contribution by investing oil revenues in fish processing plants, communications and other capital projects in Greenland.

Greenlandic spokesman Hans-Pavia Rosing complained of the two-year ratification delay.

"Canada has asked for two years because of their internal matters. Alaska had asked for one year. We only need four months," he said.

The different approaches reflect the various political and economic issues facing Eskimos in the three nations.

Many observers regard the 1971 Alaska Native Claims Settlement Act as the best ever achieved by an indigenous people whose land was occupied or exploited.

The Greenlanders, granted home rule under the Danish crown last year, now have the greatest degree of political independence among Eskimos.

Studies Suggest Major Oil Deposits In Five Basins Off the Alaska Coast

By RICHARD D. LYONS
The New York Times

RESTON, Va., Jan. 26 — Scientists of the United States Geological Survey announced today the discovery of five huge undersea basins off Alaska that are believed to contain major petroleum deposits.

The promising regions lie in the outer continental shelf, off the western Alaska coast in the Bering and Chukchi Seas. Two of them extend into waters that are owned or might be claimed by the Soviet Union.

"Recent seismic exploration work there leads us to believe that the areas may have enormous petroleum resources," said Dr. Charles D. Masters of the Geological Survey.

One area, the Navarin Basin, is 150 miles long, has sediments up to 40,000 feet thick and is much the same geologically as oil-rich areas of the Gulf of Mexico, said Dr. Masters, chief of the survey's energy resources office. The basin is split by the Soviet-American boundary.

Oswald W. Girard Jr., an oil and gas geologist who announced the findings with Dr. Masters, estimated that the Navarin Basin alone held one billion to four billion barrels of oil. Other areas in the Bering Sea might hold a like amount, he said.

By comparison, the Geological Survey has estimated that the Beuafort Basin off the northern Alaskan coast contains about 500 million barrels. Oil companies recently bid more than $1 billion for leases to drill for oil and gas in that basin.

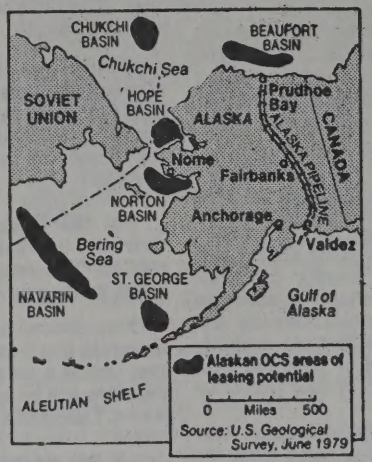
"We found these areas, told the companies about them, and now they're up there thick as fleas doing exploration," said Dr. Masters.

But he warned that even if oil were found soon, commerical exploitation would be years away. "Production problems will be severe," he said, "since drilling in these ares would stretch our technology to the limit."

Much of the region is covered with pack ice in winter, which would make year-round drilling all but impossible. Some of the basins are believed to hold layers of extremely hard volcanic sediments from underwater lava flows.

"We haven't tried to drum up enthusiasm about the Navarin Basin because we've gotten a lot of flak from the State of Alaska," Dr. Masters said, adding that local officials were worried about the social and environmental impact of oil production in the area.

The basins lie off extremely sparsely populated regions with few towns that could be used as bases for exploration and drilling parties. Similar concerns prompted a lawsuit by environmentalists and Eskimos against the Beaufort Basin leases, and a Federal judge this week enjoined execution of those leases until the environmental effects of drilling had been assessed.



The New York Times / Jan. 27, 1980

One offshoot of the North Slope oil boom has been severe inflation — and unemployment, now that the Alaska pipeline has been completed — and state officials are increasingly concerned about the problems future oil discoveries will pose.

Estimates of the amount of recoverable oil along the North Slope near Prudhoe Bay are about 10 billion barrels, making it one of the 20 largest fields in the world.

"Our recent findings in the outer continental shelf of Alaska certainly mark the basins as hot properties, but we still don't know enough about them to be sure that they contain oil," Mr. Girard cautioned.

He noted that over the last decade, several basins detected in the Gulf of Alaska, on the south side of the state, had been believed to harbor petroleum, but that none had been found. Discovery wells drilled in the Beaufort Basin, however, indicate large deposits.

Problems Posed by Boundaries

International politics also may complicate exploitation of the Navarin and Chukchi Basins, since they lie beneath both American and Soviet territorial waters, and some of the boundary lines between the two nations are unclear.

A boundary line through the Bering Strait was set by treaty when the United States purchased Alaska from Czarist Russia in 1867. But in recent years the principle of equidistance — marking the boundary in a waterway at the point halfway between the land on either side — has emerged in international law.

Should petroleum be found in the Navarin and Chukchi basins, it would be to the Soviet Union's advantage to claim the equidistance line, while the State Department undoubtedly would insist on the terms of the 1867 treaty.

Some of the American exploration parties have conducted seismic surveys in Soviet waters, and the Russians made no attempt to impede the exploration, Dr. Masters said. He said he knew of no offshore exploration by the Russians in the area.

Three Basins in U.S. Waters

The other basins that appear likely to hold large petroleum deposits are the Hope, Norton and St. George Basins, which are beneath American waters north of the Aleutian Islands.

The Geological Survey's scientists said it was possible that future seismic exploration might find still other basins with potential for oil and gas production. The survey, the Bureau of Land Management and the National Oceanic and Atmospheric Administration are spending about $25 million a year for surveys of the area.

Because the areas of the basins are considered Federal lands, as opposed to Alaskan state lands, major oil and gas discoveries would greatly benefit the United States Treasury, which now receives almost $2 billion a year in royalties from mineral production by private companies.

This amount is expected to rise sharply as the prices of oil and of drilling rights continue to increase.

Oil flow began 3 years ago

June 20

ANCHORAGE (AP)—The first oil gushed into the trans-Alaska oil pipeline three years ago today, and since then more than 1.24 billion barrels of crude have been drawn from the wells at Prudhoe Bay.

It took more than a month for the first oil to course its way through the 800-mile pipeline from Alaska's North Slope to the marine terminal at Valdez.

Ripley's BELIEVE IT OR NOT

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A DECLINE IN WHALING THAT CAUSED A WHALE OIL ENERGY CRISIS LED THE U.S. DEPARTMENT OF AGRICULTURE TO WARN IN 1850: "As a consequence, the United States...is becoming dangerously dependent on foreign sources"

Submitted by Tom Higgins, Grahamsville, N.Y.

Satellite Hints At Reversal of Magnetic Poles

By JOHN NOBLE WILFORD

The New York Times

IN 1,200 years, if the present trend continues, Earth's magnetic poles should do a flip-flop, and all those compass needles that normally point north will then be pointing south.

For several years, scientists studying Earth through spacecraft observations have noted an apparently slight, steady decline in the intensity of the magnetic field. They postulate that this could be the early sign of an approaching magnetic reversal, which happens at intervals of 50,000 to 1 million years. The last well-documented reversal occurred 700,000 years ago.

New data confirming this trend of declining magnetic intensity have now been gathered by the first American spacecraft expressly designed to study Earth's magnetic properties.

The spacecraft, called the Magnetic Field Satellite, or Magsat, was launched last October and plunged out of orbit last Wednesday, burning up over the Norwegian Sea between Greenland and Norway. The 400-pound Magsat operated a couple of months longer than planned and produced data for more accurate maps of Earth's crustal magnetic irregularities, which could be important clues in the search for minerals and petroleum.

But Dr. Robert A. Langel, the chief project scientist at the Goddard Space Flight Center in Greenbelt, Md., said the findings related to the magnetic reversal were the only results ready to be announced. He cautioned that the 1,200-year estimate was based on the assumption that the current rate of declining intensity of the force lines in the Earth's magnetic field — the roughly north-south dipole — would remain constant. It is thus possible, he said, that the reversal could come sooner or much later.

Other than the obvious influence on compasses, the consequences of a magnetic reversal are as unclear as the causes. Since the magnetic forces extending out from Earth act as a shield against cosmic radiation, the substantial decrease in the magnetic field's strength accompanying the reversal period could leave Earth dangerously unprotected, according to Dr. Edward R. Benton, a University of Colorado geophysicist who is on the project. Some scientists have theorized that widespread extinctions of species might be attributed to magnetic reversals, but this has not been substantiated. However, man's evolutionary predecessors managed to survive one or more magnetic reversals.

That such reversals do occur became known in recent decades, although the first hint was uncovered in 1909 by a French scientist, Bernard Brunhes. He found ancient lava flows imprinted with a magnetic polarity opposite that of rocks younger and much older.

Magnetic particles in molten rock orient themselves with magnetic force lines, and this alignment becomes frozen as a permanent record of polarity at the time the rock solidifies. In recognition of this discovery, the present time of magnetic polarity, going back 700,000 years, is known as the Brunhes Epoch.

Although no one really understands the mechanism of a magnetic reversal, it is believed that, because of changes in the dynamics of the Earth's core, the intensity of the magnetic field diminishes. At some point, perhaps when the intensity is 10 or 20 percent of normal, compasses would become erratic, pointing in different directions at different places.

(Magnetic north has varied slightly over the last few centuries, but it has always been only a few degrees off geographic north.) Finally, out of these changes in the strength and structure of the magnetic field, there would be a reversal in polarity.

Dr. Benton said that the spacecraft's magnetometers found the decline in magnetic intensity to be running at a rate of a fraction of 1 percent per decade. This means that a compass needle swings to magnetic north more slowly now than it did a decade ago, although the difference is imperceptible to the eye.

Heat in the Arctic Ocean

So much heat is carried into the Arctic Ocean by a branch of the Gulf Stream current flowing north between Greenland and Spitsbergen, a group of islands, that, were it uniformly distributed, it would melt the polar icecap covering that ocean. Such melting would radically alter climates in the Northern Hemisphere, but sediment layers on the floor of that ocean show that no such melting has occurred for millions of years.

Miles McPhee, a geophysicist with the Army's Cold Regions Research and Engineering Laboratory in Hanover, N.H., has an explanation. It is based on his measurements of water temperature and density to depths of 900 feet while based last spring and summer at Fram One, a research station on ice adrift in the Arctic Ocean.

From there he was lifted by helicopter to numerous ice floes in a radius of 90 miles, covering the region where that current enters the Arctic Ocean. He believes that in most areas the warm water is kept at depth by cold water subsiding from the surface. The water sinks because it has become laden with salt expelled by newly frozen water on the surface.

Because of this, he believes that heat reaches the surface chiefly near the coastlines and does not melt ice over the central basin. His hypothesis was reported in the laboratory's publication Benchnotes.

Science Editor of Times To Get Academy Medal

The New York Times / April 9, 1980

The National Academy of Sciences in Washington announced yesterday that it was conferring its Public Welfare Medal on Walter Sullivan of The New York Times.

Mr. Sullivan, science editor of The Times, was chosen for the award because of "his clarity of expression and extensive knowledge which have enabled millions of readers to understand the means and ends of scientific research," the academy's announcement said.

The award will be presented to Mr. Sullivan at a ceremony on April 21 in conjunction with the academy's annual meeting in Washington. He will receive a medal and an illuminated scroll.

Mr. Sullivan joined The Times in 1940 as a copy boy shortly after graduation from Yale University. He served as an officer in the United States Navy in World War II, rejoining The Times in 1946.

Subsequently he reported from China, covered the Korean War and was Berlin bureau chief from 1952 to 1956. After returning to New York from Berlin, he began writing about science.

Arctic letter kept in cold storage 106 years

By Reuters

Vienna

A letter written by an Austrian explorer in the Arctic nearly 106 years ago recently was delivered in Vienna.

Foreign Minister Willibald Pahr presented the Austrian Academy of Science with the letter, found by Soviet explorers in December 1978, and recently returned through diplomatic channels.

Explorer Karl Weyprecht left the letter in a wooden box in Franz Josef Land, east of Spitzbergen in the Barents Sea. The letter was to inform the world that his expedition had discovered the Edge Island Chain in May 1874.

His ship became stuck in thick pack ice, but the expedition returned home safely.

Q. *Why does water expand when it freezes?*

A. Initially, as water cools it contracts in the manner typical of most substances. At a temperature of about 39 degrees Fahrenheit, however, fresh water begins to expand. By the time it has reached 32 degrees and solidified into ice, it has expanded roughly 8 percent. It expands because the distance between molecules in the crystal structure of ice becomes greater than the space between molecules in the liquid state.

Glacier in the Royal Society Range

Photos by R. Norman Matheny, staff photographer

Antarctica's link with climate

By David F. Salisbury

The Christian Science Monitor

Boulder, Colo.

Reconstructing Earth's past climate is a scientific puzzle whose pieces are slowly dropping into place.

The latest piece whose fit has been confirmed is the role of the Antarctic ice sheet in global glaciation. Two assessments published in the journal Nature earlier this year support an idea proposed in 1964 by a New Zealand scientist, Alex T. Wilson. He suggested that rapid expansion of, or a surge in, the Antarctic ice sheet could trigger an ice age.

Dr. Wilson's theory, simply stated, is that the ice sheet is basically unstable. During interglacial periods, the ice builds up on the polar continent. At a certain point, however, it begins to flow rapidly over the adjoining ocean to form "a great ice shelf" as much as 10 million square miles in extent. This new area of ice would act as a giant radiator-reflector – reflecting more of the sunshine while efficiently radiating infrared (heat) energy into space. Thus it would act to cool the entire globe. This temperature drop would be enough to start the glaciers in North America and Europe growing, Dr. Wilson suggested.

More recently, the theory has been refined. The general opinion now is that, rather than a giant ice shelf, the ice surging onto the sea would break up into a flotilla of icebergs. Also, proponents of the Wilson theory have realized that the Antarctic consists of five glacial basins. Each basin, in all probability, acts independently of the others. So the idea of the entire ice sheet thinning and spreading rapidly at the same time is oversimplified. Instead, it now is thought that each basin surges with its own rhythm. At certain times, two or more basins would surge more or less simultaneously.

Shortly after Dr. Wilson put forward his theory, John T. Hollin – now with the Institute of Arctic and Alpine Research here – pointed out that, if such a tremendous quantity of ice surged off the land over the ocean, this would cause a worldwide increase in sea level of as much as 45 feet – a rise that should be revealed by a re-establishment of ancient coastlines.

Now "the required geological test for Wilson's theory appears fulfilled," comments D. Q. Bowen of University College of Wales. The support comes from the work of Dr. Hollin and a group of Australian scientists working in Papua New Guinea. The Huon Peninsula in New Guinea is an area of geologic uplift. As a result, past shorelines now are clearly visible on land.

Paul Aharon, John Cnappell, and William Compston of the Australian National University studied these ancient shorelines and found evidence that a sea-level rise of 25 feet occurred 120,000 years ago, just before the onset of the last ice age. From analysis of the shells of giant clams living at the time, the scientists also conclude that the water was 3 degrees cooler. That would have been a temperature drop even greater than would be expected from the effect of melting Antarctic ice alone.

". . . we conclude that an Antarctic ice surge seems likely to have initiated the last glaciation," the scientists state.

Dr. Hollin, on the other hand, has drawn from a number of sources to support his contention of an even greater surge 95,000 years ago, at the beginning of a "stadial," or colder, period within the last ice age.

Various types of geological evidence from Europe, Africa, Australia, and North America indicate the occurrence of a sudden 52-foot rise in sea level at that time.

Periodic ice surges now are well recognized in glaciology. Ice floes that normally move at an imperceptible rate suddenly begin surging as much as a mile a day for a brief period. The largest surge that has been seen occurred in Spitzbergen. A 20-mile front of ice pushed 20 miles out into the Barents Sea in a matter of months.

Surging appears to depend more on the depth of the ice sheet than directly on the climate. Once ice covers an area to sufficient depth, geothermal heat begins melting the bottom of the glacier. This water acts as a lubricant and, after a period of time ranging from a decade to a century, the gla-

cier surges.

"The process is relatively independent of changes in the climate," Dr. Hollin says.

In 1976, a group of scientists demonstrated convincingly that, for the past 500,000 years, Earth's climate has varied in tune with changes in the amount of solar radiation the planet receives. These insolation changes are due to variations in Earth's orbit and the tilt of its axis. They were first suggested as a cause for climatic change by a Yugoslav geophysicist, Milutin Milankovitch.

The variations are slight, however. The question of how they could trigger the major climatic change between glacial and interglacial periods remained open. Now it seems that the best candidate for such a "climatic amplifier" is the Antarctic ice sheet.

As suggested by Professor Bowen, "Perhaps major periods of continental glaciation only took place when a combination of Antarctic surge and favorable Milankovitch conditions arose."

According to this theory, when a major Antarctic surge took place during a Milankovitch cold period, an ice age resulted. There is evidence for abrupt temperature drops during interglacial periods which cannot be explained by orbital variations. These could be the result of surges during Milankovitch warm periods.

"Surges initiate a period of glaciation, and Milankovitch factors may control the outcome," Dr. Hollin says.

There remain a number of loose ends; but at least the broad outline of a plausible theory for the start of an ice age is emerging.

Seventh Soviet Base Is Established in Antarctica

By THEODORE SHABAD

The New York Times / March 24, 1980

The Soviet Union has disclosed that it has set up a new Antarctic base, the first on the inaccessible and little explored west coast of the ice-covered continent.

The station, called Russkaya, meaning Russian, is the seventh permanently staffed Soviet base in Antarctica and is the first Russian post to be set up since 1971. The United States runs four year-round stations, and others are operated by Argentina, Chile, Britain, France, Poland, South Africa, Australia, New Zealand and Japan.

The establishment of the Soviet base, which was reported in a Soviet shipping newspaper, Vodny Transport, was completed earlier this month after a 12-day unloading operation that was interrupted by snowstorms and gale-force winds.

The base lies on a rocky outcrop on Cape Burks, in the Hobbs Coast section of a vast region of west Antarctica known as Marie Byrd Land. Cape Burks, at 74 degrees 46 minutes south latitude, 136 degrees 52 minutes west longitude, lies about 500 miles east of Little America, the base area used in the early years of Antarctic exploration by Rear Adm. Richard E. Byrd of the United States. The cape is about 1,000 miles east of McMurdo Station, the present American base in Antarctica on the Ross Sea.

Marie Byrd Land was discovered by Admiral Byrd in 1929 and named for his wife.

Focus on Meteorology

The scientific program at Russkaya, focusing on surface and upper-air meteorology, is expected to help fill in data through year-round observations in a little-known part of the coast.

The outpost is in a sector that has remained unclaimed by any nation. Since the first territorial rights in Antarctica were asserted by Britain in 1908, a number of countries have advanced territorial claims in the shape of pie slices, some of them overlapping. The claims remain in abeyance under the Antarctic Treaty, a pact signed in 1959 and in effect since 1961 that regulates free access and research rights in Antarctica.

The Russians, who have made no claims to Antarctic territory, have had their eye on the Hobbs Coast area since the early 1970's, when it was surveyed by the Ob, a Soviet supply ship, and a potential station site was selected.

The base was to be established by the Soviet expedition of 1978-79, the 24th since continuous international activities on the continent began in the middle 1950's. Anticipating the plans, the National Science Foundation's Division of Polar Programs, which manages the United States' Antarctic research effort, included Russkaya on a 1978 map of stations.

However, the base was not set up, possibly because of particularly difficult ice conditions, and was deferred until the 25th expedition, in the present Antarctic summer season, which coincides with the Northern Hemisphere winter.

The broken sea ice around Antarctica reaches its highest concentration off the west coast, and this has been a factor in delaying activities there. Aside from a few interior stations, permanent bases are along the more accessible East Antarctic coast and on islands off the Antarctic Peninsula, a tongue of land stretching toward the tip of South America.

Late last month, the 9,280-ton Soviet freighter Gizhiga, with a reinforced hull designed for ice navigation, managed to approach to within 15 miles of the projected station site. Between the 436-foot-long ship, under the command of Capt. Yuri D. Utusikov, and the coast was fast ice, a belt of solid sea ice fastened to the shore that is sometimes used by supply ships as an unloading platform.

During the first winter it will be staffed by a team of nine, headed by V. Stepanov, an upper-atmosphere specialist.

The emperor penguin's hidden sex

Scientists have finally succeeded in telling the male emperor penguin from the female without dissecting them. This achievement probably will make no difference to the penguins, who have no trouble distinguishing males from females, but it does solve a problem that arises because the penguins have no external features to indicate which sex is which.

Henning Scheich, a West German scientist working at the Hubbs-Sea World Research Institute in San Diego, sorted out the penguins by studying their voices. More accurately, Scheich studied the trumpet calls that the emperor penguins emit in a number of situations, including a ritual of bowing to each other.

Last spring, Scheich recorded the trumpet calls of 35 emperor penguins kept at the San Diego facility. He found that there are two distinctive patterns, one consisting mostly of long pulses and the other with short pulses predominating. As a working hypothesis, Scheich labeled the two patterns as "male" and "female."

Confirmation came when two penguins at the facility laid eggs. Scheich had been watching the penguins and their mates, and other researchers had taped their trumpet calls. It developed that the long-pulse calls are emitted by male penguins and the short-pulse calls are emitted by females, which is exactly what Scheich had thought.

Ann Bowles, a researcher who recorded the calls, says that they can be told apart with less than an hour's practice. Now scientists who want to collect emperor penguins for breeding programs don't have to worry about getting the proper mix for good results.

Daily News Science Editor Edward Edelson

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Scientists Reviving Speculation on Slipping Antarctic Ice

By WALTER SULLIVAN

The New York Times / March 9, 1980

Scientists are reviving the controversial notion that millions of cubic miles of Antarctic ice can sometimes abruptly slip off the continent into the sea, resulting in extreme increases in global ocean levels and precipitating a dramatic chilling of the world's climate.

A fear of some climate specialists is that such a surge could be caused in the Antarctic by a warming of the global climate as a result of increased fuel burning. The burning increases the amount of carbon dioxide in the atmosphere, which then acts like a greenhouse roof, trapping warmer air.

The Department of Energy is taking this possibility seriously enough to sponsor a conference on the subject April 8-10 at the University of Maine in Orono.

An ice slippage, or surge, is believed to have occurred about 95,000 years ago, when world sea levels apparently rose about 60 feet, enough to flood almost all of Florida. Measurements taken in New Guinea coral reefs indicate that a rise in the sea level of more than 26 feet occurred about 120,000 years ago, which is when many scientists believe the last great ice sheets began forming on North America and Eurasia.

Theory of Linked Events

In the Feb. 14 issue of the British journal Nature, Paul Aharon, John Chappell and William Compston of Australian National University in Canberra propose that the two events were linked. "We conclude," the authors wrote, "that an Antarctic ice surge seems likely to have initiated the last glaciation."

The authors studied coral reefs on the Huon Peninsula of New Guinea. These reefs are constantly lifted out of the sea by geologic forces, and protect the beaches from wave action, keeping them intact for the study of ancient sea levels.

Small-scale ice surges are known to occur when the ice accumulation in a glacier becomes unstable and the ice flows rapidly down a valley. It has been proposed, however, that surges sometimes involve large ice sheets.

Nevertheless, so far there is no widely accepted evidence indicating that a surge is imminent.

In the same issue of Nature, John T. Hollin of the University of Colorado in Boulder, who first studied the surge hypothesis when he was a graduate student based in Antarctica, restates his case for catastrophic ice surges, mentioning both new and old observations.

Evidence in Bones

Dr. Hollin, along with other proponents of the surge hypothesis, cites the finding in the 1950's of the remains of many mammals in an excavation in Trafalgar Square. The remains — hippopotamus, rhinoceros, elephants and other animals — dated from the period before the last ice age, and could have been buried by a sudden flooding, such as that caused by an ice surge. The original explanation for the mass burial was the biblical flood.

A British geologist, R. P. Cotton, noted that fleet-footed animals, such as deer, were curiously absent. Perhaps, he said, they were able to "avoid being submerged with their less active contemporaries by escaping to the hills."

In the Nature report, Dr. Hollin also cites the fact that a study of samplings from giant stalactites found in a French cavern and from deep borings of the Greenland ice sheet indicate that there was a sudden cooling of the climate about 95,000 years ago.

In addition, ancient pollen deposits from Greece, Illinois and France indicate a sudden shift from vegetation typical of forests to that of the chilly steppes and prairies. In sediment cores from the Gulf of Mexico there is an abrupt transition from warm-water organisms (foraminifera) to those typical of cold water.

Volcanic Dust Theory

Some researchers believe that the last global cooling started about 90,000 years ago and was caused by volcanic dust, which blocked sunlight from reaching the earth. But Dr. Hollin believes it was caused by a surge, probably from East Antarctica — the region south of Australia that includes Wilkes Land and Queen Maud Land.

There has been much research recently on the stability of the West Antarctic ice sheet, much of which is more than a mile thick, but according to Dr. Hollin's calculations, sea levels would rise only 20 feet if all of it slipped off the continent.

This would be enough to flood many areas, including much of Manhattan, but insufficient to account for the more extreme sea-level rises suggested by the evidence cited by Dr. Hollin and the Australian group. However, if all the East Antarctic ice slipped into the sea — which is improbable — the average global rise in sea level would be almost 200 feet.

There have been earlier supporters of the surge hypothesis. In 1964 A. T. Wilson of Victoria University in New Zealand proposed that massive surges of Antarctic ice may have initiated each of the ice ages.

While in most places the continental ice sheet is two or three miles thick, he reasoned that after falling into the sea its average thickness would decrease to about 1,000 feet, resulting in ice covering much of the southern oceans. The brilliant white surface of this vast ice shelf would reflect enough solar energy back into space to cool the global climate and initiate an ice age.

In Less Than a Century

The rate at which sea levels would rise following such a surge is uncertain, but one piece of evidence, cited in Dr. Hollin's article, indicates that the interval would be much less than a century.

Many scientists have shunned the surge hypothesis as a revival of "catastrophism," a theory that accepts the reality of a global flood, as described in the Bible.

The leading explanation for the ice ages is a theory proposed in the 1920's by Milutin Milankovitch. This theory has recently gained strength as scientists have made a more precise timetable of the ice ages.

According to this theory, the key factors are cyclic changes in the earth's orbit and the tilt of its axis, which control the amount of solar energy reaching high latitudes during the time of year when the winter snows normally melt. If the changes are such that the snows do not melt, an ice age is under way.

There is some question as to which theory is right. D. Q. Bowen of the University College of Wales in Aberystwyth proposes that both theories may be partly correct. "Perhaps major periods of continental glaciation only took place," he wrote in a recent article, "when a combination of Antarctic surge and favorable Milankovitch conditions arose."

Australian scientists, using a computer, have been simulating the many factors believed to determine whether or not an ice sheet surges. These include its thickness, melting at its base caused by frictional heat and the nature of the under-ice terrain.

Two of them, W. F. Budd and B. McInnes of Melbourne University, have concluded that minor Antarctic ice surges occur roughly every 5,000 years and major ones at intervals of 100,000 years.

Carbon Dioxide in the Ice Age

An analysis of two deep Antarctic glacial cores containing ice that formed 15,000 to 20,000 years ago in the coldest part of the Ice Age indicates that there was about half as much carbon dioxide in the atmosphere then as there is today. The French scientists who made the analysis reported that the level of carbon dioxide in the Ice Age was .016 percent, as against .033 percent today.

The researchers said that unlike previous tests, there was little contamination of the samples because of the use of new methods in which the ice cores were crushed in closed containers at below-freezing temperatures and released gases were then measured. Previous tests for carbon dioxide had shown levels comparable to those of today.

The French scientists said that the previous methods extracted carbon dioxide from melted ice samples in a vacuum, which resulted in the gas being found in air within bubbles in the ice and in the infinitesimal interstices of the ice. They also noted that carbon dioxide also had been released by the decomposition of dissolved carbonates or carbonate particles that might have been present because of contamination from outside sources.

The use of more sophisticated methodology resulted in findings that were not affected by possible contamination, the researchers reported in a paper published in a recent issue of Nature, the British scientific journal.

Unicorn of the Sea

The narwhal, the single-tusked member of the whale family that is rarely seen by anyone except Eskimos, explorers and occasional whalers, has long made marine scientists wonder what it uses its spiraled tusk for. It has been suggested that the tusk, which often grows to seven feet or more, is used to uncover ocean-bottom prey, to pierce prey before killing, to pierce surface ice to make breathing holes, as a cooling mechanism or as a sound transmitter.

But two scientists from the Marine Sciences Center at McGill University in Montreal, who spent the summer months of three consecutive years observing narwhals and their behavior, believe they have found the answer. They reported in a recent issue of the journal Nature that they saw many narwhals that crossed or struck their tusks against those of other narwhals both above and below the water surface in a kind of friendly social activity that suggested mating or rutting behavior sequences.

They also found that many dead specimens offered to them by native Eskimos on Baffin Island in the eastern Canadian arctic had many scars on their bodies, broken tusks and parts of tusks imbedded in their flesh. They deduced that these were the result of both biting and spearing by the narwhals that occurred during play, sexual activity and aggression.

Field Museum of Natural History, Chicago

The single spiralled tusk of the narwhal is used for friendly social activities as well as for aggression during the mating season.

Federal Electric Company named new support contractor

Antarctic Services Inc., a newly formed subsidiary of the Federal Electric Corporation, has been selected as the new support contractor for the United States Antarctic Research Program. The company will assume full responsibility for contracted support of the program beginning 1 April 1980.

Antarctic Services Inc. replaces Holmes & Narver Inc. of Orange, California, as the major support contractor for the U.S. Antarctic Research Program. Holmes & Narver provided support for the program from early in 1968 through the end of the 1979-80 field season.

The contract calls for the new company to provide procurement and supply services, to manage seasonal construction activities and provide maintenance and operational support at Palmer, Siple, South Pole, and McMurdo Stations, and to operate R/V *Hero*. The contractor will manage warehousing and staging facilities at Port Hueneme, California, Christchurch, New Zealand, and Ushuaia, Argentina, and provide technical and administrative support to USARP year-round.

The Federal Electric Company, through another subsidiary, has had 20 years experience in the Arctic, furnishing operational and maintenance services to the U.S. Air Force's Distant Early Warning and Ballistic Missile Early Warning systems.

Rodney E. Gray, previously the project director for Federal Electric's arctic involvement, has been named project director for the antarctic support contract. Headquarters for Antarctic Services Inc. are in Paramus, New Jersey.

Federal Electric Company is a wholly owned subsidiary of the International Telephone and Telegraph Corporation

Canadian balloonists take historic trip above the North Pole

April 15

The scene itself was glorious, "a lot of color you wouldn't expect—gold, pink, blue," **Eleanor Conn** said. The arctic odor was something else: diesel fuel so thick that it permeated the clothing she and her husband, **Sidney**, wore on their trip last week at the top of the world.

The Canadian couple, from Calgary, Alberta, became the first persons to fly by balloon over the North Pole. They made the 30-minute flight in a six-story-high, 77,000-cubic-foot airship that was floated by the blue heat of its propane burners. The Conns, both in their 30s, spent six months and almost $100,000 on the project.

After traveling to the Pole by airplane with the collapsible vehicle, the balloonists floated across the polar ice cap Friday and landed squarely on top of the world. "We were able to land at 90 degrees North without any problem," Mrs. Conn said. "It was on a pad circled by water."

WILLIAM ROBERTSON LATADY died on 13 October 1979, aged 61. Born on 14 February 1918 and educated at Harvard University and Massachusetts Institute of Technology, Bill Latady joined Finn Ronne's Antarctic Research Expedition, 1947–48, as the official photographer. The expedition wintered alongside the Falkland Islands Dependencies Survey base E on Stonington Island, and Americans and British alike soon recognized Latady's extraordinary range of abilities and skills. He could turn his hand to anything that required manual dexterity, inventiveness and patience, from the installation and calibration of the trimetrogon air cameras to making a replacement needle for a sewing machine. As a skier and mountaineer he was in a class by himself. For those who lived and worked alongside him we remember him as a real person with a pungent, yet never unkind wit, for his repartee and brevity of speech. He showed great loyalty to people when loyalties were under strain, complete reliability, and had an ability to lead when he was not the leader and to cause no offence as he did so.

In the non-expedition sense, Bill was no less outstanding. He bullied the West German Goertz firm to produce a specialist copying lens to his design which is still a world-beater. He became an international installer of 'Cinerama', managing both the technical and financial side of the business, and invented and marketed a high-speed photographic system for surveying airport runways. He was a founder member of the Juneau Ice Field Project and was active in this research field until the 1970s. His ability as an optical engineer was recognized when he was awarded the American film industries technical oscar for a ceiling mounted remote control studio camera.

As Professor Maynard Miller writes, 'he was a tinkerer, a craftsman, an inventor, a genius in his own field, and probably the finest optical engineer in North America'. For all of us who overwintered with Bill at Stonington Island, knowing him was a highlight that we will never forget. The world could do with a few more Bill Latadys.

Polar Record Kevin Walton

The following background information on the Canadian Arctic Islands is supplied through Canada Post:

In 1880, Canada acquired Britain's claim to the Arctic Islands, crowning 10 years of national growth which had seen Canada absorb British Columbia, the Hudson's Bay Company territories and Prince Edward Island. Never before had such a small country gained so much territory so peacefully and so quickly.

Britain's explorers had been establishing that country's rights in the Arctic archipelago ever since the 16th century. Men such as Frobisher, Hudson, Button, Bylot, Baffin, Fox, Ross, Parry, Franklin, Rae, Penny, McClure, Kennedy, Belcher and McClintock discovered practically all the land there.

Only in the 19th century did American explorers arrive, and only at the end of the century did a Norwegian, Otto Sverdrup, find the Rignes Islands and Axel Heiberg Island.

During the 1860s, France and Russia recognized the supremacy of the United States in North America, and withdrew from the area. Britain itself quietly began to withdraw after the Anglo-American crisis of 1861.

Britain thus promoted Confederation, theorizing that it would reduce the chances of further Anglo-American conflict. In 1870, the imperial government handed a good part of the continental interior over to the new Dominion.

Events in 1874 precipitated action on the Arctic Islands. An Englishman inquired about their ownership, and an American requested a land grant there. Officials in London reasoned that "if this Yankee adventurer is informed by the British FO (Foreign Office) that the place indicated is not a portion of H.M. dominions, he would no doubt think himself entitled to hoist the 'Stars and Stripes' . . ."

To mollify the Americans and to prevent them from seizing the islands, Britain offered them to Canada in 1874. Legal arguments about the best way to make the transfer, and a futile attempt to define the region's boundaries, caused a delay of six years, but on Sept. 1, 1880, Canada at last took possession.

Ironically, the government largely ignored the islands until 1895, when foreign initiatives there forced it to pay attention to the region and act to establish its claim more firmly

1910–1916 Antarctic Photographs: Scott, Mawson and Shackleton Expeditions, by Herbert Ponting and Frank Hurley. New York, St. Martin's 1979. 119p. $12.50. 79-3746 0-312-04215-9

The photograph is spectacular: Viewed from above, amid the rigging of a ship, four or five figures wrapped in oilskins labor on a deck awash in sea water. The picture is angled—the ship's mast slices the photograph in half, revealing a violently heaving ocean. This is the *Terra Nova*, the ship that conveyed the doomed Antarctic expedition led by Captain Robert F. Scott, in a Force 10 gale that cost the expedition the lives of several sled dogs and ponies and much of its precious fuel.

But where is the photographer? Hanging, perhaps, from the violently careening rigging of the topmast, holding at an awkward angle the bulky camera used to capture the frantic scene below. Herbert Ponting, the British photographer who at age 40 joined the Scott expedition that was to race Amundsen to the South Pole, was a painstaking craftsman who destroyed many of the photographic plates he considered inferior. The images he prized are collected in this slender volume, along with the photographic record of two later expeditions made by Australian cameraman Frank Hurley.

The courage of these two photographers is matched only by their devotion to their craft and their delight in adventure. A remarkable series of photographs taken by Hurley reveals the dramatic story of another expedition led by Ernest Shackleton in 1914. Five months after sailing from Buenos Aires, the expedition ship *Endurance* was hemmed in by polar ice twenty miles from land. Nearly a year after setting up camp on the ice, the exploration team watched as the *Endurance* was ground to pieces by ice floes. Shackleton decided that the team of approximately twenty men should travel 350 miles to Puget Sound in the hope of rescue. Quoting from Frank Hurley's diaries, Jennie Boddington writes in the introductory essay:

> Hurley was ordered to leave his plates and films behind. Undaunted, the next day Hurley dived into "the mushy ice in the semi-darkness of the ship's bowels" to retrieve his films. Shackleton caught him in the act but agreed they should save a selection. . . . Hurley smashed 400 plates and retained 120. He abandoned all the gear except for one small pocket camera and three rolls of film. He wrote, "Later I had to preserve them almost with my life; for a time came when we had to choose between heaving them overboard or throwing away our surplus food—and the food' went over."

Almost six months later, the group reached Elephant Island by rowing across the breaking ice. Shackleton and a crew of five men departed with the largest boat to seek aid. Marooned for 135 days, starving, and exhausted, the remaining party (including Hurley) was rescued by a Chilean trawler with Shackleton aboard. Not one man on the expedition died.

Not all the photographs in this collection portray the drama of the expeditions. Studies of wildlife and ice forms, clouds and blizzards, reveal a deep sense of beauty. Working in extreme conditions with facilities that were primitive even by the standards of the day, the photographers produced images that are exceptional for their technical quality. Countless numbers of photographs have been taken of Antarctica since these first images were made, but the work of Ponting and Hurley stands apart, timeless and heroic.

The Canadian $100 gold coin: the queen and a kayak

The new Canadian dollar

Canada is entering the new year with two substantial new coins designed to mark the centennial of the transfer of the Arctic territories from English to Canadian control. The historic importance of that transfer is enormous, and gave the young Canada a substance in world thinking that continues to grow.

The influence of the Arctic territories makes Canadian culture, art and commerce distinctive, and the new coins celebrate elements of Arctic life. A new dollar, containing 50 percent silver, will be issued this spring. The coin bears the queen's portrait on the obverse, but the reverse, designed by Donald Paterson of Toronto, shows a polar bear on an ice floe with the northern lights flaring under the legend "Canada Dollar."

The new $100 gold coin will contain one half ounce of gold. Its design, by Arnaldo Marchetti of Montreal, shows an Inuit in a kayak with a rugged iceberg in the background. The reverse bears no legend or date

Press communique issued by the Chairman of the Tenth Antarctic Treaty Consultative Meeting

The Tenth Antarctic Treaty Consultative Meeting completed its work on October 5. Attending were delegations from the thirteen Antarctic Treaty Consultative Parties (Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, Poland, South Africa, the U.K., the U.S.S.R., and the U.S.). During the three-week meeting held in Washington, D.C., there was detailed discussion of a wide range of issues relating to Antarctica.

The Tenth Consultative Meeting marked the twentieth anniversary of the Antarctic Treaty which was signed in Washington, D.C., in 1959. The Treaty, including the system of Consultative Meetings it establishes, has been a unique example in international cooperation.

One of the most important results of the Treaty system is that it has established Antarctica as a zone of peace. The Treaty provides that Antarctica shall be used exclusively for peaceful purposes. Military activities, including establishment of military bases and fortifications, the carrying out of military maneuvers, or the testing of military weapons, are prohibited in Antarctica. The Antarctic Treaty, therefore, represents a landmark development in the field of arms control. The Treaty also prohibits nuclear explosions or the disposal of nuclear waste in Antarctica.

In addition, the Antarctic Treaty establishes a basis for international collaboration in scientific activities. The record of cooperative scientific activities and the importance of the results in expanding knowledge not only of Antarctica but of our planet as a whole over the past 20 years have more than justified the efforts of those who designed the Treaty. In the political sphere as well, the Antarctic Treaty represents a dynamic form of cooperation among states with differing legal and political perspectives.

For all of these reasons, the representatives participating in the Tenth Consultative Meeting believed it both appropriate and important to commemorate the success of the first two decades in the operation of the Antarctic Treaty system, and to rededicate themselves to the maintenance of that system and to the continuing fulfillment of the Treaty's ideals. This recommitment to the Antarctic Treaty system was considered particularly relevant at a time when new issues relating to resources in Antarctica have come to the forefront.

The Consultative Parties start from a common position in approaching these difficult and complex questions. That is the basic importance they attach to the principles and purposes of the Antarctic Treaty with emphasis upon the protection of the antarctic environment, an emphasis of the Consultative Parties since their first meeting.

During the Tenth Consultative Meeting informal discussion led to important progress toward fulfillment of the objective, articulated in 1977, of creating an effective regime for the conservation of antarctic marine living resources. The Consultative Parties remain committed to the prompt establishment of such a system.

The Tenth Consultative Meeting also witnessed extensive consideration on the subject of antarctic mineral resources. Again the shared environmental concern of the Consultative Parties formed a major basis of their deliberations. The recommendation adopted on this subject represents substantial progress.

The representatives also recalled that their responsibilities for ensuring effective treatment of these resource issues are balanced with the need to ensure that the interests of all mankind in Antarctica are not prejudiced.

The representatives of the Consultative Parties also agreed on recommendations dealing with operational aspects of their activities in Antarctica, including recommendations dealing with cooperation in antarctic telecommunications, development of agreed practices and guidelines for tourists who may visit there, and recommendations designed to prevent harmful impacts from human activities in the Antarctic Treaty area.

Antarctic Treaty Consultative Meetings

I	1961	Canberra
II	1962	Buenos Aires
III	1964	Brussels
IV	1966	Santiago
V	1968	Paris
VI	1970	Tokyo
VII	1972	Wellington
VIII	1975	Oslo
IX	1977	London
X	1979	Washington

The representatives believed that the nature and results of their three weeks of deliberations justified continued confidence in the strength and responsiveness of the Antarctic Treaty system. They reaffirmed their commitment to finding imaginative and equitable solutions to the evolving issues in Antarctica. To this end, they welcomed the invitation extended by the Government of Argentina to host the Eleventh Consultative Meeting in 1981.

ANTARCTIC JOURNAL

December 1979

The 266-foot ice-strengthened research ship *Islas Orcadas* was returned to the United States by the Argentine Navy on 1 August 1979 upon termination of a 5-year lease of the ship from the U.S. Navy. The Argentines operated the ship from 1974 to 1979 under an agreement between the National Science Foundation and agencies of the Argentine government concerning cooperation in obtaining and exchanging oceanographic data.

The ship, originally named the *Eltanin*, was built in 1957 as an ice-strengthened Navy arctic supply ship and converted in 1961–62 to meet the National Science Foundation's need for a research platform that could operate in the oceans surrounding Antarctica. From 1962 to 1972 the U.S. Navy 's Military Sealift Command operated the ship in antarctic waters for the National Science Foundation. The *Eltanin* made 55 cruises totalling 410,000 miles and 3,014 days at sea. In December 1972 the Foundation was forced to stop operating the ship because of a budget cut.

The loss of *Eltanin* removed the Foundation's ability to support research in the southern ocean.

Dr. Mary Alice McWhinnie

By Mary K. Gapa

Dr. Mary A. McWhinnie, 58, internationally known DePaul University biologist and Antarctic researcher, died Monday, March 17, in Hinsdale Hospital after a lengthy illness.

McWhinnie had been a member of the DePaul faculty since 1946. Active in the field of biology, she served as chairman of the University's department of biological sciences from 1966 to 1968 and was named to "Outstanding Eductors of America" in 1977.

McWhinnie received her doctorate from Northwestern University in 1952. Since then she had continued research on the metabolism of crustaceans in temperate zones and received a number of government and private grants to aid in her studies

In 1962 she became the first American woman scientist to participate in the U.S. Antarctic Research program in the field. She was selected by the National Science Foundation (NSF) as one of 28 scientists to go on two two month research cruises in the south polar regions aboard the S.S. Eltanin, the NSF's ocean-going laboratory.

In 1972 she served as the chief scientist aboard the Eltanin.

In 1974 she became one of the first two women scientists to winter-over in Antarctica. McWhinnie had made 11 scientific trips to Antarctica-the last in 1978. On several of her travels, McWhinnie had the assistance of undergraduate and graduate students.

Since 1975 she has become known world-wide for her scientific work with the krill, a shrimp-like crustacean which inhabits the waters around Antarctica. She is best known for her studies on the krill's distribution, habits and potential food source.

Since 1952 McWhinnie has had over 50 articles published in scientific journals. She has presented research papers at meetings of the American Society of Zoologists, Division of

Dr. McWhinnie

Comparative Physiology and Division of Comparative Endocrinology.

Her activities outside of DePaul included membership on the Panel on Biological and Medical Sciences of the National Academy of Sciences of the Committee on Polar Research and the Advisory Committee for Research of the National Science Foundation.

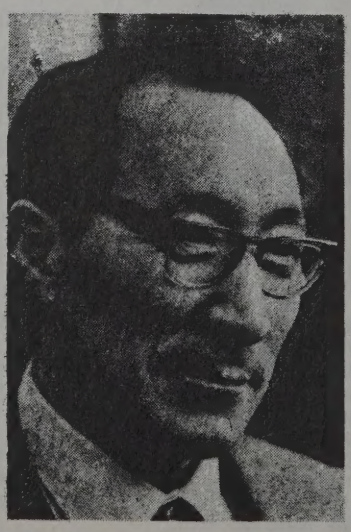
She is survived by two sisters, Mrs. Vivina (Glenn) Ortner and Dr. Dolores McWhinnie, and brother David.

Eben Hopson

June 30

North Slope Borough Mayor Eben Hopson, 57, died Saturday of cancer at the Public Health Service Alaska Native Hospital in Barrow. A visitation will be held from 4 to 7 p.m. at the Utkeagvik Presbyterian Church in Barrow. A funeral will be held at 7:30 p.m. tomorrow at the Barrow High School gymnasium, with the Rev. Samuel Simmonds of the Utkeagvik Presbyterian Church officiating.

The four-hour funeral will be broadcast by radio sation KBRW, which is heard throughout the area from Kaktovik to Point Hope. Burial will follow in Barrow.



Eben Hopson

Hopson helped build the Utkeagvik Presbyterian Church and with his brother, helped design and build the adjacent Christian Education building, also owned by the Presbyterian Church. Utkeagvik is the Eskimo word for Old Barrow and means "place where they hunted snowy owls."

He was born in Barrow on Nov. 7, 1922, to Al and Maggie Hopson and was the grandson of Alfred Henley Hopson, an English whaler who settled in Barrow in 1886.

His political career spanned more than three decades of state, national and international politics. He was the only person to hold the position of mayor of the North Slope Borough, served as a member of the Barrow City Council, as a representative in the Alaska Territorial Legislature and as a state senator from 1958 until 1966.

As executive director of the Alaska Federation of Natives, he was the chief spokesman for 55,000 natives prior to passage of the Alaska Native Claims Settlement Act by Congress in 1971. He was a prime mover behind the first worldwide conference of Eskimos held at Barrow in November and was an advocate of environmental safeguards to protect the Beaufort Sea from unnecessary risks associated with oil and gas development.

Survivors include his wife of 38 years, Rebecca; seven sons, Charles, Eben Jr., David, William, Lloyd, Patrick and Emory; five daughters, Margaret, Pauline, Kathy, Patsy and Georgianne; and several grandchildren.

The Anchorage Times

Casey A. Jones

Casey A. Jones, the Holmes & Narver Inc. cook assigned to Amundsen-Scott South Pole station, died 9 January 1980 when he was caught under a collapsing column of snow. Mr. Jones was removing snow that had plugged a vertical air intake shaft when the column gave way.

This was Mr. Jones's second tour in Antarctica. He wintered at Palmer in 1979.

At the request of his family, Mr. Jones's body was cremated in New Zealand. His ashes were committed to the Antarctic from an LC-130 airplane in flight over the Beardmore Glacier on 25 January.

Flags of the United States, the U.S. Antarctic Research Program, and Holmes & Narver were presented to Mr. Jones's family along with a posthumous Antarctica Service Medal.

Holmes & Narver employees in Antarctica prepared a memorial plaque that was mounted at South Pole Station in honor of Casey Jones's service to the U.S. Antarctic Research Program.

Meteorite Field

A new field of meteorites, collected and preserved relatively unchanged from their pristine condition in space, has been found in Antarctica 200 miles north of the American base at McMurdo Sound. It may be three to four times as extensive as the Allen Hills area nearer McMurdo, where a rich harvest of meteorites has been found over the past several years. In the new area near Reckling Peak, 27 meteorites were spotted in a quick survey during the recently ended Antarctic summer, which coincides with the northern winter. It is assumed there are many more.

The find was reported by the National Aeronautics and Space Administration, which is using the same sterile retrieval and storage technique for the meteorites as for moon rocks. In the frigid, dry and isolated environment of Antarctica, the specimens have been relatively free of terrestrial contamination. Those previously found — both near the Allen Hills area and earlier by the Japanese in the Yamato Mountains on the opposite side of the Antarctic continent — are providing clues to the chemical evolution of material forming the early solar system.

Q. *Have the North and South Poles always been located at the same place?*

A. The spin axis of the earth is subject to two wobbles. One is that typical of spinning bodies defined by the Swiss mathematician Euler. The other, or chandler wobble, is less well understood. Both shift the poles only a few dozen feet.

Over the past millions of years, however, it is evident that the earth's magnetic poles have wandered far and wide. The implication is that the spin axis has also wandered widely. It is assumed that the earth's magnetism is generated by a combination of spinning and churning motion within the liquid core. If so, the magnetic axis should never wander very far from the spin axis.

Changes in the distribution of land masses due to continental drifts may account for past changes in the spin axis. Seemingly unrelated to these wanderings are irregular reversals of the earth's magnetism. Over perhaps 1,000 years, the magnetism of the earth weakens, then each magnetic pole reappears with the former magnetic polarity of the opposite pole.

Q. *How are icebergs formed?*

A. Icebergs are huge pieces of glacial ice that are "calved" off the outward edges of Arctic and Antarctic glaciers, or ice sheets. As snow accumulates on polar ice, the snow crystals consolidate into ice which flows or spreads under the weight. About 16,000 Arctic icebergs break away every year, approximately 90 percent of these from the Greenland glaciers. Each year, an average of 400 Arctic icebergs travel as far south as Newfoundland, and then into the Gulf Stream where the warm waters melt them.

Typical Antarctic icebergs are immense flat "islands" measuring hundreds of square miles in area. These "tabular" icebergs calve from the extensive ice sheets of Antarctica, particularly from their extension out to sea in floating "ice shelves."

Lt. Comdr. JACK BURSEY
USCGR

Bursey, veteran of Byrd's Antarctic expeditions, dies

MONTAGUE — Former U.S. Coast Guard Lt. Cmdr. Jacob "Jack" Bursey, a veteran of two of Rear Adm. Richard Byrd's expeditions to Antarctica, died Sunday in Lakeshore Community Hospital in Shelby.

Bursey 76, of 6773 Old Channel Trail in Montague participated in Byrd's first Antarctic expedition of 1928-1930, which was the first to spend the winter on the southern cohtinent.

In Byrd's 1939-1941 expedition, Bursey participated in an 80-day, 1,200-mile dog team trip to the South Pole. Because he was one of the first men to ever reach three ice peaks in Antarctica, one of them — Mt. Bursey — was named after the retired lieutenant commander on that expedition.

Bursey retired in 1954 but returned to Antarctica from 1955 to 1957 as a technical advisor to Operation Deepfreeze 1, which was established to construct government bases there. He also served as navigating officer on the U.S. Icebreaker Northwind on three Arctic expeditions.

Born in 1903 in St. Lunaire, Newfoundland, Bursey married Ada DeGraff in 1934 in Grand Rapids. The Burseys settled in Montague in 1960. Bursey is survived by his widow.

THE MUSKEGON CHRONICLE, Monday, March 24, 1980

Finn Ronne, Explorer, 80, Dead; Had 9 Expeditions to Antarctica

By GEORGE GOODMAN Jr.
The New York Times / Jan. 14, 1980

Capt. Finn Ronne, the explorer who traveled by ski and dog sled some 3,600 miles — more than any other man in history — to chart the vast, frozen wastes at the South Pole, died Saturday of a heart attack while asleep in his Bethesda, Md., home. He was 80 years old.

In 1933 as ski expert, dog driver and trail radio operator, Captain Ronne accompanied Adm. Richard E. Byrd on his second Antarctic expedition. Then he followed in his father's footsteps.

Martin Ronne, his father, had been a sailmaker for the Roald Amundsen South Pole expedition of 1911. On a leather tent strap left behind for his son to find, when he traveled there in 1934, the father had inscribed the name Finn along those of his eight other children.

A lecturer and author in recent years, Captain Ronne had recently completed "Antarctica My Destiny," to be released by Hastings House. It will be his fourth volume concerning his lifelong quest — exploration on the continent of Antarctica, the forbidding, ice-locked frontier at the bottom of the world.

Nine Times in Antarctica

Captain Ronne, a relentless and temperamental Norwegian-born explorer, traveled to Antarctica on nine occasions that included four blistering winters in which he and his teammates faced harrowing daily adversities and inhospitable weather with temperatures averaging 30 degrees below zero during days and nights of snowstorms with raging winds of 60 miles an hour.

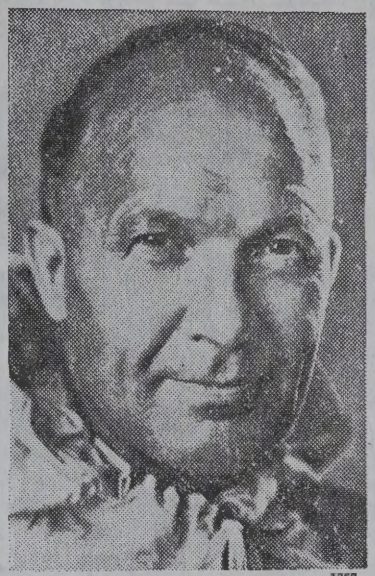
On the 60th anniversary of the Amundsen expedition, the explorer and his wife were flown to the South Pole under auspices of the United States Department of Defense.

In the words of his close friend, Lowell Thomas, the writer and announcer, Captain Ronne's name was a "legendary name in polar exploration and his story is one of the greatest tales of adventure in our time."

Captain Ronne led his own expedition to the Palmer Peninsula sector of Antarctica in 1946 for 15 months. In an article he wrote during one of the winters he spent on Stonington Island, he said:

"Upon this small group of 22 members, which also manned and operated a 1,200 ton diesel drive ship, rests the responsibility not only of maintaining the camp but also of conducting studies in the fields of geology, meteorology, seismology, terrestrial mangetism, solar radiation and cosmic and tidal observations. In addition we are engaged in extensive geographic exploration involving both trail travel and aerial photography."

The results of that expedition resulted in a cornucopic harvest of scientific information and detailed geographic surveys concerning the continent's four million square miles.



1957

Finn Ronne

That trip was notable, too, as the first occasion of its kind to include the participation of women as scientific researchers, one of whom was Captain Ronne's wife, Edith. The other scientist was Jenny Darlington.

Though the expedition was highly praised for its effectiveness in gathering information, some of Captain Ronne's colleagues later complained that the explorer was difficult to live and work with.

He reportedly used code names for his colleagues and made ridiculing comments about their work. Driven to make substantial accomplishments, rather than simply seek adventure, he set excruciating standards for productivity but lived up to them in his own performance.

Included among 14,000 aerial photographs the Ronne expedition produced were areas of Weddell Sea previously never seen by explorers.

Born in Horten, Norway, Finn Ronne came to the United States in 1923 as a naturalized citizen. He had attended Horten Technical College, earlier, receiving a degree in engineering.

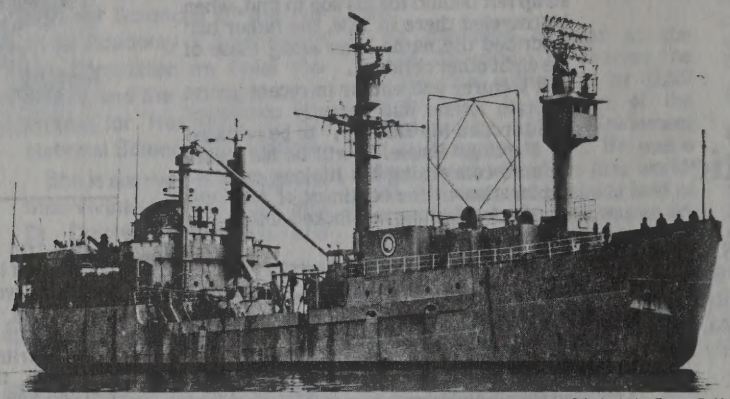
Commissioned a lieutenant in the United States Navy, he was assigned in the United States Naval Reserve, attaining the rank of captain. He later worked for the Central Intelligence Agency.

Captain Ronne held three Congressional Gold Medals, the United States Navy's Legion of Merit, the Explorers Club Medal, the Norwegian Order of St. Olav V. He was a board member of the Explorers Club and the Norsemen Masonic Lodge.

In addition to his wife, the explorer leaves a daughter, Mrs. Karen Ronne Tupex, and two brothers, John and Rolf.

NSF photo by Franz-Dieter Miotke

Last season geologists and glaciologists were deployed by helicopter from a single base camp to small temporary camps (below) throughout the Darwin Glacier vicinity. This season the same field camp concept will enable researchers to deploy to various sites throughout the Ellsworth Mountains.



NSF photo by Peter C. Harper

USNS *Eltanin*, loaned to the Argentine Naval Hydrographic Service and operated as the ARA *Islas Orcadas* from 1974 to 1979, was returned to the U.S. Navy in August 1979.

U.S. Navy photo (90342-12-78) by Michael P. Helms

UH-1N helicopters deployed to field camps provide mobility for researchers. This one landed on a frozen lake near Derrick Peak during a December 1978 survey.

U.S. Navy photo (90435-1-79) by James Gilcrist

Investigators will return to Lake Hoare in the dry valleys, shown here in January 1979, to study and retrieve samples of the algal mats that live on the bottom of the lake.